

The MARENCO Group
A Company committed to
"HALTING THE SPREAD OF AIS GLOBALLY"

The Marine Environmental Combat Group
Ballast Water Treatment System

MARENCO BWTS

- 10 patents pending
- Innovative-novel design
- Very cost effective

The MARENCO Group

- Howard Roop EdD
 - President and CEO, Rear Admiral USNR (ret.)
- Hap Nguyen EE
 - Sr. VP Engineering & Design, Lt. South Vietnamese Navy
- Murray Fowler MBA
 - Sr. VP Admin. & Marketing, Capt. USNR (ret.)

BWTS Objectives

- ✓ Simple
- ✓ Effective
- ✓ Flexible
- ✓ Seamless
- ✓ Safe
- ✓ Reliable
- ✓ Durable
- ✓ Cost Effective

MARENCO's Results

- ◆ Four year design evolution
- ◆ Achieved stated goals - PLUS!

BWTS General Characteristics

- Efficacious Two Stage Treatment System
- Mechanical Filtration & UV Irradiation
- Novel non-congested main deck location
- In-port delivery-no installation costs
- No or minimal ship modification needed
- No modifications for vessels with 600 cubic meter BW capacity or less
- Utilizes fire system piping and hydrants
- Treat @ discharge-settled ballast water
- Compact, movable, stowable, scaleable
- Total dry weight approx. 500 Lbs.
- Mounted on locking wheels
- Dimensions 5' H x 6' L x 1' W
- "Color Blind" to vessel type being treated
- Technology used in drinking water and food industries
- Environmentally benign - harmless

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Presented at Washington State Ballast Water Treatment Technology Forum May 14, 2003

- No chemicals used - no residue
- Secured - seaworthy at all times
- 20 year life expectancy
- Minimal crew time to operate and service

Engineered Specifications

- ◆ Stainless steel construction housing the dual stage system and its power supply
- ◆ Wheeled for mobility - locks in place
- ◆ Stage 1 Treatment
 - Mechanical filtration at 25 microns
 - Long life - replaceable filter
- ◆ Stage 2 Treatment
 - Medium pressure HO UV lamp array
 - 2700 watts of UVC - more than 1 second exposure
 - UV transparent quartz sleeve
 - Anti-fouling UV sensors
 - Automatic triggering for sleeve wiping
 - Operates at 220 volts, 3 phase @ 30 amps
- ◆ Dedicated computerized controller
- ◆ Programmable minimum kill energy to assure eradication
- ◆ Multiple displays of real time operating data
- ◆ System history can be downloaded

Operational Specifications

- Standard modular configuration
- Two stage self contained system
- Stage 1 & Stage 2 share enclosure
- Uses standard shipboard power
- Designed to process 100 cubic meters per hour per standard module
- Optionally process 200 cubic meters per hour per module
- 500 gallon flow rate/minute/module
- Modules scalable to increase BWT capacity
- Automatic anti-sleeve fouling operation
- Proprietary computerized controller system
- Real-time component data display
- System history - available for regulatory reporting

Crew Friendly Design

- ◆ 10-15 minute initial set-up
- ◆ Minimal crew training to operate and service
- ◆ Very little crew time - near seamless operation
- ◆ Crew attention at discharge only
- ◆ Minimal maintenance
- ◆ Vivid-simple-visual alert for filter change
- ◆ Replaceable filter - 5 min. or less
- ◆ Accessible UV section
- ◆ Durable fool-proof design
- ◆ Well secured from elements
- ◆ Easy to move to other locations
- ◆ Mounted on locking wheels
- ◆ UV section protected from shock and vibration

Versatile Functional Design

- Scaleable-for larger capacity needs
- Functions reliably-virtually any vessel
- Removes/eradicates all marine life-forms
- In-port-service vessel capability
- Or on service barge
- Or dockside vehicle-smaller vessels
- Or OEM

Proof of Concept Testing

- ◆ Prototype tested aboard Evergreen's Hatsu Eagle on 8-24-02 and conducted by an Independent State certified lab.
- ◆ 50 samples taken for 5 test categories
- ◆ 10 untreated and 40 treated
- ◆ 25 micron filtration & UV irradiation
- ◆ 3 different UV power settings used
- ◆ Detailed lab analysis
- ◆ Range of eradication effectiveness - 99.54 to 99.91%
- ◆ Testing validated design concepts
- ◆ Our design confirms research at University of Miami and others

Definitive Research

- Most have concluded 2 stage system most effective
- Most other 1st stage filtration @ 50 microns
- Most other 2nd stage UV irradiation - brief exposure
- Specific order is significant for results
- MARENCO's enhanced design - followed & validated

Current impediments to our BWTS

- ◆ Lack of legislative mandates
- ◆ Lack of capital

MARENCO-Actively Seeking Financial Partner

- \$1.5 Million - testing into production
- Independent testing ready via Tenera Environmental
- Evergreen Shipping - OK's platform for in-port & underway testing
- Informal proposal approved by S.S. Smith and his committee
- Manufacturing sources/suppliers in place
- Core personnel identified
- Final assembly, UV electronics and QA by MARENCO

After Funding, Testing Protocol Follows In Rapid Order

- ◆ Complete pre-production prototype
- ◆ All shipboard testing - Evergreen Shipping
- ◆ First phase - lab tests
 - 1 day onboard in-port
- ◆ Second phase - lab tests
 - 2 days - independent lab conducted at site-Oxnard, CA
- ◆ Formal proposal-submitted to WA State
- ◆ Following approval - underway tests

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- ◆ Third phase testing - 7 day West Coast itinerary
 - Long Beach - Oakland - Seattle/Tacoma -Vancouver
- ◆ Fourth phase testing - 23 to 26 day itinerary
 - Long Beach - Panama Canal -Charleston, SC - Norfolk, VA -Baltimore, MD - New York, NY - London, UK
- ◆ Submit results to WA State Fish and Game for certification and verification
- ◆ Commence marketing of MARENCO BWTS

What does MARENCO's BWTS Cost?

- \$ ____ per self-contained standard module
- Negotiable quantity pricing
- 100 Cubic meters or Approx. 108 metric tons/hour
- Maximum rated processing capacity-500 GPM

Included Cost Features

- ✓ FOB Ports of LA & LB
- ✓ Other Ports @ agreed upon cost +S&H
- ✓ 1 year guarantee-parts and labor
- ✓ 2,000 hour UV system guarantee
- ✓ Warranted eradication @ 99 % effectiveness

Maintenance Costs

- ◆ 6 UV Lamps @ 2000 hours
 - \$300 each or .009 cents per cubic meter treated
- ◆ Filters @ 20,000 cubic meters
 - \$300 each or 1.5 cents per cubic meter treated
- ◆ Total 2.4 cents per cubic meter treated

SUMMARY

- ❖ By thinking and designing "outside the box" the MARENCO BWTS has emerged as innovative and novel, a truly "fresh design" for this new marine industry segment.
- ❖ MARENCO's BWTS is a logical, efficacious, easily regulated, better option than Open Ocean BW exchange.

The MARENCO Group

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